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that Hill, with his genius and originality, should have spent the best years of his life on computations which could have been carried through by others if the necessary delay in training them for the work had been granted.

Hill published a number of other papers on a variety of astronomical subjects, many of them worthy of careful study for Hill always put the impress of his own mind into his memoirs, even when developing the ideas of his predecessors. The Carnegie Institution of Washington has published Hill's memoirs in four large quarto volumes.

For practically the whole of his life Hill was a member of the staff of the Nautical Almanac office, doing his work as far as possible at his home in West Nyack, N. Y. He cared little for money or luxuries, and resigned his post as soon as he had completed the tables of Jupiter and Saturn. He was essentially a man who lived for the development of his own ideas and who cared little for contact with his fellow men. Nevertheless those who knew him well, and were in the habit of accompanying him on the walks or trips which he frequently took in the country, always speak of the pleasure of his companionship. But few people knew him personally, and his life was so uneventful that the biographer finds little to record, yet his name will live after those of most of his generation are forgotten.

He was born in New York City on March 3, 1838, and died at his home in West Nyack, N. Y., on April 16, 1914.

E. W. Brown.

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## EDWARD SINGLETON HOLDEN (1846-1914)

Fellow in Class I, Section 1, 1885.

Edward Singleton Holden was born in St. Louis, Missouri, on November 5, 1846. He was a student in Washington University, St. Louis, in the years 1862–66, and was graduated in the latter year with the B. S. degree. William Chauvenet, author of the well known "Manual of Spherical and Practical Astronomy," was Chancellor of, and Professor of Mathematics and Astronomy in, Washington University during that period. It is probable that Mr. Holden pursued astronomical studies with Professor Chauvenet, but his interest in astronomical subjects had been aroused on the occasions of visits to

Harvard College Observatory while his cousin, Professor George P. Bond, was director of that institution (1859–65). Mr. Holden married Professor Chauvenet's daughter Mary in the year 1871.

During the years 1866–70 Mr. Holden was a cadet in the U. S. Military Academy at West Point, graduating in the latter year. He ranked third in his class. In 1870–71 he was Second Lieutenant in the Fourth U. S. Artillary, in the following year Instructor in Natural Philosophy in the Military Academy, and in 1872–73 Instructor in Practical Military Engineering. In 1872 he published an octavo treatise on "The Bastion System of Fortifications, Its Defects and Their Remedies."

In March, 1873, Lieutenant Holden resigned his commission in the army to accept appointment as Professor of Mathematics in the U. S. Navy, for service as astronomer in the U. S. Naval Observatory at Washington. There he came at once into close personal relations with Simon Newcomb, serving as assistant to Newcomb with the just completed 26-inch Clark refracting telescope. It is clear from historical developments, as well as from passages in Newcomb's "The Reminiscences of an Astronomer," that Newcomb was tremendously impressed with Holden's energy and ability. When Mr. D. O. Mills, President of James Lick's first Board of Trustees, went to Washington in 1874 to consult with Newcomb concerning plans for the projected Lick Observatory, Newcomb "suggested that a director of the new establishment should be chosen in advance of beginning active work, o that everything should be done under his supervision. As such director I suggested that very likely Professor Holden, then my assistant on the great equatorial, might be well qualified."

It is an illuminating comment upon Professor Holden's promise as an astronomer of the future that he should be recommended, and I think tentatively selected, as the director of the proposed Lick Observatory, to contain the largest and most powerful telescope in existence, at a time when his astronomical experience had covered little more than one year. Professor Holden was then less than twenty-eight years of age.

Professor Holden went to London in 1876 as a delegate from the U. S. Government to examine and report upon the South Kensington Loan Collection of Scientific Instruments, especially as to improvements in the astronomical and geodetical instruments.

While on the staff of the Naval Observatory, Professor Holden made himself very familiar with the literature of astronomy; he observed comets, nebulae, satellites and double stars; he prepared and published bibliographies relating to nebulae and star clusters, to the transits of Mercury, and to other subjects; he prepared annual reports on the progress of astronomy; he published a critical description of the 26-inch refracting telescope, a monograph on the Nebula of Orion, a volume on The Life and Works of Sir William Herschel, and, in collaboration with Professor Newcomb, a textbook on astronomy.

Professor Holden was in charge of an expedition dispatched by the Naval Observatory to observe the total solar eclipse of July, 1878, at Central City, Colorado.

In 1881 Professor Holden resigned his commission in the navy and accepted the directorship of the Washburn Observatory, University of Wisconsin. This position he held during the years 1881–85. At Madison he organized and pushed the observational work of the Washburn Observatory with vigor.

Professor Holden was in charge of the expedition sent by the National Academy of Sciences to observe the total solar eclipse of May, 1883, in the Caroline Islands, where he was assisted by four young astronomers whose names later became well known: C. S. Hastings, E. D. Preston, S. J. Brown and Winslow Upton. An extensive program was carried through successfully. The volume containing the observational results is a model in form, and is frequently referred to by eclipse observers.

In 1885 Professor Holden was appointed President of the University of California and Director of the Lick Observatory, to serve in the former capacity until the Observatory should be completed, and thereafter in the latter capacity. He assumed the active directorship of the Lick Observatory on June 1, 1888. Professor Holden was consulted extensively by the Lick Trustees, beginning with 1874, and during the last three years of the construction period he was intimately associated with the Trustees as adviser.

Professor Holden's term of office as the first Director of the Lick Observatory terminated by resignation on December 31, 1897.

An astronomer has said that "the first requisite for the director of a great observatory is to have a very clear notion of just what kind of work ought to be done, how it should be done, and then to give all the aid in his power to the investigator." Director Holden selected the most promising men he could find in the United States to comprise the Observatory staff. He assigned them definitely to lines of research which the succeeding years have shown to be of the highest importance. He gave them such opportunities to succeed as no other astronomers had ever enjoyed. In particular, he gave them great liberty of action. To quote from Newcomb's "Reminiscences," page 190: "The institution made its mark almost from the beginning. I know of no example in the world in which young men, most of whom were beginners, attained such success as did those whom Holden collected around him."

The evidences of Professor Holden's organizing ability and energy are written all over the Lick Observatory. His own scientific work in the Lick Observatory related principally to the photography of the Moon, but the administrative duties did not leave him much time for personal research. The last years of his administration were marred by the existence of animosities in the observatory community, and by much ill-advised criticism in the newspapers. The time has not come for any member of the staff in Professor Holden's administration to attempt a published discussion of the subject.

From November 1901 until the time of his death, Professor Holden was Librarian of the U. S. Military Academy. In this position he was extremely successful.

Many distinguished honors were conferred upon Professor Holden. He was elected Foreign Associate of the Royal Astronomical Society in 1884; a member of the National Academy of Sciences in 1885; and later to membership in the Astronomical Society of France, in the Italian Spectroscopic Society, in the American Academy of Arts and Sciences, etc. He received the degree of LL.D. from the University of Wisconsin in 1886, and from Columbia University in 1887; the degree of Sc.D. from the University of the Pacific in 1896; and the degree of Litt.D. from Fordham College in 1910.

Professor Holden's interests took a wide range. He has published: on the bastion system of fortifications; on studies in Central American picture writing; "The Mogul Emperors of Hindustan," a delightful volume, dated 1895; "Mountain Observatories" (1896); "Pacific Coast Earthquakes" (1898) the "Centennial History of the U. S. Military Academy, 1802–1902"; and several other volumes, as well as many popular and semi-popular magazine articles.

Professor Holden died at West Point on March 16, 1914, where he was buried with military honors. The event marked the passing of a remarkably able and interesting man.

W. W. CAMPBELL.